between varying HNPs and kinematics of the back and hind limbs. However, little research has related forelimb kinematics to HNP. The objective of this study was to quantify changes in forelimb kinematics in response to 4 commonly used HNPs to determine any correlation of HNP to gait quality. Four stock-type horses, accustomed to a regular riding program, of comparable height and neck length were used in a Latin square design to test the following HNP treatments: (1) free/loose, 2) high/flexed, 3) low/flexed, 4) neutral/flexed. HNPs were accomplished through the use of a chambon and side reins attached to a surcingle fitted to each horse by the same handler. The same snaffle bit was used on each horse. Horses were trained for 6 d over a 2-wk period before data collection to acclimate them to each HNP. Three synchronized cameras (Xcitex Procapture, Woburn, MA, USA) set to record at 150 fps were used to record horses as they trotted freely down a 30 m concrete pad. Horses had previously been clicker trained to trot at a consistent speed toward a tennis ball at the end of the pad. Only repetitions that fell within 10% of 3.8 m/s were used for analysis. Recordings were done consecutively in one day. Data were analyzed using SAS version 9.4 (Cary, NC, USA) with treatment as the variable. Preliminary results show no influence of HNP on stride duration with results ranging from 0.56 s in both low and free HNPs to 0.58 s in high HNP. Similarly, no treatment effect was observed in the percent of stride duration spent in the swing phase, ranging from 56% swing in free HNP to 58% swing in high HNP. Results of this study indicate no temporal adaptations of the forelimb to different commonly used HNPs. Further research should look at a larger number of animals, a longer acclimation period, and the effects of HNP on forelimb loading and joint angles.

Key Words: kinematics, gait, neck

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Method-comparison analysis between a Contour Next glucometer and YSI 2900 biochemistry analyzer in equine

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The YSI biochemistry analyzer is known as the gold standard for laboratory glucose analysis in human and animal medicine; however, it is expensive and not always readily available. Glucometers designed for humans assume a constant and stable relationship between plasma and erythrocyte glucose concentrations that may not apply universally across all species. The objective was to compare glucose measurements from a human glucometer with a YSI 2900 biochemistry analyzer. We hypothesized that the human glucometer would have adequate accuracy and precision for research and veterinary non-emergency diagnostics. From April 7 to May 15, post-prandial whole-blood glucose samples were obtained via jugular venipuncture from 8 horses consuming pasture-only diets. Four hundred forty-eight whole-blood samples were tested upon collection using a Contour Next glucometer and compatible test strips (Bayer Corp., Pittsburgh, PA). Plasma was frozen at −40°C before laboratory in-house analysis using a YSI 2900 biochemistry analyzer for glucose. Paired samples were analyzed using 2 methods. Bias and limits of agreement, according to Bland-Altman, were calculated using the difference in YSI and glucometer vs. the mean. Then, % bias was calculated according to the formula: (mean glucometer value-YSI standard value)/YSI standard value × 100%. According to the manufacturer, the glucometer would be reliable if 95% of all differences in glucose values were within 15 mg/dL for glucose values <75 mg/dL and within 20% of glucose values ≥75 mg/dL. For the second criterion, the agreement was considered acceptable if there was <20% difference from the YSI standard. If the precision exceeded these criterions, the difference between methods would be deemed unreliable and the glucometer would be rejected over the YSI. Method comparison between the YSI and glucometer yielded a mean bias of 5.295 mg/dL (SD: 8.905 mg/dL; 95% CI: −12.16, 22.75 mg/dL), meaning the glucometer consistently underestimated the true value of glucose. According to the first criterion, 4.5% of values <75 mg/dL fell outside of the 15 mg/dL difference and 7.2% of values were >20% the difference in methods. For the second criterion, 7.0% of measurements fell outside of the YSI standard value, meaning that 93% of the values exhibited acceptable agreement. The glucometer generally exhibited favorable agreement to the biochemistry analyzer, despite chemical differences between whole blood and plasma glucose. Although the glucometer exhibited values outside of the reference range, the glucometer could have practical value for large sample-size research and non-emergency veterinary diagnostics.

Key Words: glucometer, YSI, glucose

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A new model for quantifying hoof pressure distribution using Fujifilm

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Evaluating hoof load is important to better understand how the hoof interacts with the substrate. The barefoot horse may suffer from hoof damage depending on hoof strength and riding surface. Some horse owners are not interested in shoeing their horse for economical or naturalist reasons. Hoof boots may provide a way to protect the hoof by absorbing and better distributing the pressure between the hoof and ground surface. The objectives of this study were to evaluate dynamic pressure incurred by the bare foot and to determine the effect of Cavallo Trek hoof boots on pressure distribution over the riding surfaces, asphalt and crushed-stone fines. Five mature geldings and mares (BW 1331 ± 82; age 7–25 yr) were used for this study. On November 18, 2018, horses were walked over Low Prescale Film (Fujifilm, Sensor Products, Inc., Madison, NJ), with a detection range of 350 to 1400 PSI, that was cut into sixty 54 cm × 61 cm sections. Hoofprints were collected 3 times on each surface (crushed-stone fines and asphalt) and for each treatment (barefoot and booted). Twelve prints per horse were sent to Sensor Products Inc. for full pseudocolor analysis using Topaq imaging software. Pseudocolor imaging revealed variations in pressure over the hoof wall and solar surface, as well as the minimum pressure (PSI), maximum pressure (PSI), mean pressure (PSI), standard deviation of pressure (PSI), contact area (sq in), and force (lbf). The coefficient of variance between replicates for mean pressure ranged from 0.3 to 10%. Differences in pressure between treatments were analyzed using paired *t*-tests and 2-way ANOVA with the class variables treatment, surface, and their interaction. Preliminary testing revealed that the hoof boot created more low-pressure regions on the film than barefoot, meaning that the hoof boot absorbed more force and distributed more pressure upon impact. Mean pressure was less ($P < 0.001$) on crushed stone fines than asphalt, regardless of treatment. On asphalt, the hoof boots tended ($P = 0.057$) to lower the pressure incurred by the foot compared with being barefoot, such that the booted foot encountered less pressure (−46 PSI; 95% CI −94, 2). Horses used in trail riding on rugged terrains may benefit from a hoof boot on hard surfaces to protect them from excessive concussion and hoof damage. Further investigations

on the benefit of a hoof boot versus a metal horse shoe are warranted.

Key Words: horse, hoof boot, pressure

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Comparison of total radiographic bone aluminum equivalences (RBAE) from digital radiographs to bone ash content of the equine third metacarpal

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Previously, estimating bone mineral content (BMC) in horses with radiographic bone aluminum equivalency (RBAE) used film radiographs. As digital radiographs are now common, digital post-image processing algorithms distort RBAE values, making it ideal to use unprocessed images. Results from digital radiographs have not been compared with actual BMC. This study compared measurements of inner and outer bone diameter and cortical width using calipers on a bone sample and using imaging software on a radiograph. In addition, this study compared RBAE values from raw radiographs to BMC from fat-free bone ash. Digital radiographs of dorsal–palmar (DP) and lateral–medial (LM) views were taken of 6 MCIII from equine cadavers with an 11-step Al stepwedge in each view as part of an ongoing project. Post-image processing algorithms were removed to obtain raw radiographs. A 2-cm transverse section of bone, 1 cm below the nutrient foramen, and each cortex was analyzed using Quantity One (BioRad). For each image, a linear regression was created using the known stepwedge thicknesses ($R^2 > 0.99$) and a minimum of 8 points. RBAE values of each bone and cortex were obtained using Al stepwedge linear regression equations. A 2-cm section of bone corresponding to the area analyzed on the radiograph was excised from each MCIII. Total RBAE was measured by taking the intensity x area of the cross section of the bone and expressing it in relation to a known volume of Al calculated from the intensity x area of steps 4 to 8. Cortical thicknesses as well as DP and LM bone and medullary cavity diameters of each sample were measured using a caliper and on digital images using ImageJ software. The excised samples of bone were ether extracted, oven-dried, and ashed. The fat-free bone ash was recorded as BMC in grams. Statistics were analyzed using PROC CORR in SAS 9.4. The measurements of dorsal, medial, and lateral cortices showed a trend toward being similar ($R^2 > 0.74$, $P < 0.09$) between measuring with a caliper on the bone sample and with imaging software on the radiograph, but palmar cortex measurements were not ($R^2 = 0.41$, $P = 0.42$). LM bone diameter and DP/LM medullary cavity diameter were similar between the 2 methods ($R^2 > 0.95$, $P < 0.01$). DP bone diameter tended to be the same between methods ($R^2 = 0.78$, $P = 0.07$). Total RBAE compared with BMC data showed a strong correlation ($R^2 > 0.93$, $P < 0.01$). These results suggest that using digital radiographs to make bone measurements is an accurate method. These data confirm the strong relationship between total RBAE and bone ash and emphasize the need to use unprocessed radiographs for digital analysis.

Key Words: bone, ash, radiographic bone aluminum equivalency (RBAE)

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Meteorological and lunar influence on the occurrence of colic in horses

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Colic is a life-threatening condition in horses, causing financial and economic loss in the equine industry. Some causes of colic are well documented, but the influence of weather on colic is not fully understood. Out of 155 equestrians surveyed for this study, 46% listed “weather/changes in weather” as one of the top 3 causes of colic, confirming the prevalence of this belief. The objective of this study was to find any significant association between the preceding 12- or 24-hour net changes in and/or daily minimum and maximum values of temperature, barometric pressure, or humidity and the occurrence of colic over a 1-yr period in approximately 100 horses housed together in Long Valley, New Jersey. Also included was any significant association between phase of the moon and the occurrence of colic in this population. A colic was identified by common and accepted behavioral displays, such as anorexia, decreased manure production, and/or signs of abdominal pain. Each colic case was diagnosed by the Centenary University resident veterinarian. There were 29 d in which colic occurred, representing 7.95% of the days in the one-year study period. IBM SPSS Statistics (Version 23) software was used for all analyses. Odds ratios were calculated via univariate binary logistic regression for all weather variables and their net changes; none were significantly different from one ($P > 0.05$). There was a significant association between moon phase and colic days, as assessed by Fisher’s Exact test ($P = 0.012$), with a small to medium effect size (Cramer’s $V = 0.222$) and the highest frequencies of colic occurring during the waxing gibbous and full moon. Colic risk was associated with aforementioned lunar phases, but all other weather variables and net changes considered were not predictive of colic.

Key Words: colic, horse, weather

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Omeprazole does not affect cribbing behavior in horses

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Previous research has suggested a connection between gastric disturbances, such as ulceration, and cribbing behavior in horses. The objective of this study was to measure the effects of omeprazole in altering stereotypical behavior in cribbing horses. The 15 horses in the study were selected based on their chronic cribbing behavior and absence of any additional chronic medical conditions. Before the start of the study, fecal egg counts (FECs) were performed on each horse using the Modified McMaster Fecal Egg Count method and each horse was confirmed to be low (<200 EPG). Horses were randomly assigned to 2 treatment groups, each receiving either a cinnamon-flavored control paste or omeprazole paste (1 mg/kg/day) for 28 d. Each group then entered a 21-d washout period before being administered the other treatment for 28 d. On the first and last day of each treatment period, blood and saliva samples were collected and behavioral indicators (number of crib-bites performed, number of crib-bouts, and the total time spent cribbing) were recorded by a single observer. Presence of gastric ulcers was not measured. Behavioral indicators, salivary pH, body score, and plasma b-endorphin concentrations were used to assess changes in cribbing behavior. These measurements were then compared using a paired *t*-test ($P = 0.05$). The treatment period data for number of crib-bites performed on d 0 and d 28 yielded a *P*-value of 0.7310. The *P*-value for change in pH during the control period and during the treatment period was 0.5842. Data from the initial and final b-endorphin concentrations in the treatment period yielded a *P*-value of 0.3918. As this data shows, neither the omeprazole or control paste had a significant effect on any of the behavioral or